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Safety and Security

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Civil Aviation

Aviation civile

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FAA-99-663-9

Your file Votre référence

Our file Notre référence
TSO C135, AC 25.135-1X,
NPRM 99-16

November 3, 1999


Federal Aviation Administration
Attention: **Mahinder Wahi**,
Propulsion/Mechanical Systems Branch
ANM-112, Transport Airplane Directorate
1601 Lind Avenue SW.
Renton, WA 98055-4056.

1999 NOV 18 A 10:53
OFFICE OF THE
CHIEF COUNSEL
FEDERAL AVIATION
ADMINISTRATION

Subject: TSO-135: Transport Airplane Wheels and Wheel and Brake Assemblies
AC 25.735-1X: Brakes and Braking Systems Certification Tests and Analysis
NPRM 99-16: Revision of Braking Systems Airworthiness Standards

Federal Register Volume 64, dated August 10, 1999, gave notice on the availability of the subject and invited interested persons to submit their comments to the FAA. In response thereto, Transport Canada is pleased to offer, for your consideration, the comments contained in the attachments to this letter.

Sincerely,

for  A/AARDH/I
Maher Khouzam
Chief, Regulatory Standards
Aircraft Certification

Attachments: as stated

Canada

TRANSPORT CANADA COMMENTS ON
PROPOSED TSO-C135, TRANSPORT AIRPLANE WHEELS AND
WHEEL AND BRAKE ASSEMBLIES
FEDERAL REGISTER NOTICES, VOL. 64, NO. 153, DATED AUG 10, 1999,
PAGE 43579

I T E M	T S O P A G E	T S O P A R A	C O M M E N T S
1	1	2	If the TSO is to apply only to wheels and wheel and brake assemblies to be used on transport category airplanes and not to wheels and wheel and brake assys to be used on other category aircraft certified under part 23, 27 and 29, then a statement should be made somewhere to the effect that TSO-C26c is superseded by TSO-C135 only in the case of transport category airplane but is still to be used for other aircraft categories
2	1	2	Part 23 is used for commuter airplanes which passenger-carrying capabilities, weight and performance might warrant design requirements similar to part 25 airplanes and hence commuter airplanes might warrant the use of TSO-C135 instead of TSC-C26c. Has this been considered?
3	2	5.b.(1)	It is not clear which "paragraph (c)" is being referred to. It is suspected that it should rather read "paragraph (a)"
4	9	2.1	The term "airworthiness" also includes the maintenance by qualified people in accordance with an approved system. The completion of maintenance activities as such is independent from the airplane certification and equipment qualification processes once the airplane Instructions for Continuing Airworthiness have been approved. It is proposed that the word "airworthiness" be replaced by "certification requirements" throughout this paragraph
5	10	2.3.5	The use of the word "otherwise" is not understood. It is believed that it should simply be removed
6	17	3.3.1.3	The concern about not allowing a brake application speed higher than the ones used in the determination of the kinetic energy requirements to ensure that proper energy absorption rates are achieved is understood. However, it is felt that "as close as practicable" is too subjective and should be quantified. This would alleviate the certification office to have to argue with the applicant as to what a lesser but appropriate brake application speed can be for a particular project and help ensure a level playing field nationwide. Note that a similar comment has been made on the proposed AC 25.735-1X
7	17	3.3.1.3	Forbidding cooling is agreed to but the rationale for it should be provided in the TSO the same way the rationale for the increase in

			the initial brake application speed is discussed. Otherwise, forbidding cooling could be perceived as an unjustified conservative measure not representative of the actual environment. Note that efforts to ensure that the test is representative are emphasized throughout the TSO, such as for the brake wear aspects in paragraph 3.3.3.2, and one would expect the TSO to consistently aim at being representative throughout
8	17	3.3.1.4	If more than one fluid is allowed for the airplane hydraulic system, the one resulting in the more critical case scenario should be used for the tests. For example, LD-4 has a lower auto-ignition point than Skydrol 500B-4 and, if both are allowed for use on a particular airplane, the former should be used for the tests. A statement should be added accordingly. Note that the same comment has been made with respect to the proposed AC 25.735-1X
9	18 20	3.3.3.5 3.3.4.5	Maintaining BRPP _{MAX} for three minutes should be clearly identified as a passing criteria for the test; as stated currently, it appears more like a simple procedural step. The wording should be changed accordingly. Notwithstanding, what is the rationale for the three minute period (and not four or five)?
10	18 20 24 25	3.3.3.5 3.3.4.5 fig.3-1 fig.3-2	It is disagreed that the parking brake pressure be deliberately turned off after 3 minutes, as is implied by the TSO and specified by the term “OFF” in Figures 3-1 and 3-2. The test should simulate a real world scenario i.e. in the event of a high energy stop necessitating an emergency evacuation, the parking brake would be set and remain applied throughout the evacuation period and beyond. Regarding the initiation of a brake generated fire, the TSO requires that it should be shown that no continuous or sustained fire, extending above the level of the highest point of the tire, occurs before the 5 minute period has elapsed. Keeping the brake pressure applied throughout the 5 minute post stop period would help determine whether it might contribute to a fire hazard. It would, however, be acceptable for the park brake pressure to fail to be maintained after 3 minutes, since the tires would most likely be deflated by that time anyway thereby holding the aircraft stationary. It is important to determine whether the park brake design aspects of the brake assembly could be potentially deficient at the time of qualification. The TSO should be amended accordingly. Note that the same comment has been made with respect to the proposed AC 25.735-1X

TRANSPORT CANADA COMMENTS ON
PROPOSED AC 25.735-1X, BRAKES AND BRAKING SYSTEMS
CERTIFICATION TEST AND ANALYSIS
FEDERAL REGISTER NOTICES, VOL. 64, NO. 153, DATED AUGUST 10, 1999
PAGES 43579-43580

ITEM	AC PAGE	AC PARA	COMMENTS
1	8	4.b.	If more than one fluid is allowed for the airplane hydraulic system, the one resulting in the worst case scenario should be used for showing compliance. For example, LD-4 has a lower auto-ignition point than Skydrol 500B-4 and, if both are allowed for use on a particular airplane, the former should be used for showing compliance. A statement should be added accordingly. Note that the same comment has been made with respect to the proposed TSO-C135
2	11	4.f.(2)(b)	The phrase "... with the airplane in a configuration that would enable such a return to be made" might seem to indicate that the analysis is not to consider immediate return to land cases where the airplane configuration is less than ideal - which is obviously not the intent as illustrated in the NPRM discussion for §25.735(f). Furthermore, there is no discussion about the acceptable probability of failure conditions in such cases (i.e. not extremely improbable) which is an important element of the rule. Finally, it should be specified how single failure cases are to be considered since their acceptability is linked to the effect, not the probability. For example, would it be acceptable that an applicant foregoes a most severe landing stop case test on the basis that it involves an extremely improbable single failure case resulting in a hazardous failure condition (such designs have been encountered in the past)? It is suggested that the discussion in the guidance material be expanded accordingly
3	12	4.f.(3)(b)	The concern about not allowing a brake application speed higher than the ones used in the determination of the kinetic energy requirements to ensure that proper energy absorption rates are achieved is understood. However, it is felt that "as close as practicable" is too subjective and should be quantified. This would alleviate the certification office to have to argue with the applicant as to what a lesser but appropriate brake application speed can be for a particular project and help ensure a level playing field nation wide. Note that a similar comment has been made on the proposed

			TSO-C135
4	13	4.g.(3)	<p>Keeping the brake pressure applied throughout the 5 minute post stop period would help determine whether it might contribute to a fire hazard. It would, however, be acceptable for the park brake pressure to fail to be maintained after 3 minutes, since the tires would most likely be deflated by that time anyway thereby holding the aircraft stationary. It is important to determine whether the park brake design aspects of the brake assembly could be potentially deficient at the time of qualification. Consequently, a statement to the effect that parking brake should remain applied throughout a 5 minute period should be added. Note that similar comments have been made about proposed TSO-C135</p>

TRANSPORT CANADA COMMENTS ON
NPRM 99-16, REVISION OF BRAKING SYSTEMS AIRWORTHINESS
STANDARDS
FEDERAL REGISTER PROPOSED RULES VOL. 62, NO. 153, DATED
AUGUST 10, 1999 PAGES 43570-43578

ITEM	PAGE	COMMENTS
1	43573	Proposal 9 typo: in the text of the new §25.735(e)(1), replace “satisfac ory” by “satisfactorily”
2	43573	<p>Proposal 11: as proposed, §25.735(f) is difficult to read and contains too many separate requirements in itself. It could create undue difficulties during the finding of compliance. It is suggested that the paragraph be re-arranged such that:</p> <ul style="list-style-type: none">• there is a distinct sub-paragraph that can be identified for the requirement for the determination of the levels of kinetic energy and the energy absorption rates. This should indicate that three cases are to be considered (design landing stop, accelerate-stop and most severe landing stop). This sub-paragraph could also mention the caveats about the need to consider or not during testing the most severe landing stop.• there is a distinct sub-paragraph for the requirement for the wheel and brake assembly to meet the levels of kinetic energy• there is a distinct sub-paragraph for the requirement for the wheel and brake assembly to meet the energy absorption rates• the definitions of the three stop cases (the last 9 lines of the currently proposed paragraph, starting with: “... Design landing stop is an operational...” are taken out of the requirement and placed in the proposed AC 25.735-1X.